DWR'S SOUTH COAST REGIONAL FORUM

CITY OF SAN DIEGO'S EXPERIENCE WITH POTABLE REUSE

CATHLEEN C. PIERONI
PRINCIPAL WATER RESOURCES SPECIALIST

SEPTEMBER 30, 2013

City of San Diego
PUBLIC UTILITIES
Water & Wastewater

WATER REUSE TIMELINE

- 1993 — City & County Water Authority propose Water Repurification Project
- 1994-1998 — Planning, regulatory reviews & conditional approval, preliminary design on project
- Fall 1998 — Water Repurification Project becomes an issue in several closely contested political campaigns
- Spring 1999 — Project cancelled by City Council
- 2002-2004 — City enters into a settlement agreement with environmental groups committing to:
  - Evaluate improved ocean monitoring
  - Pilot test biological aerated filters
  - Study on increased water reuse

WATER REUSE TIMELINE

- 2004-2005 City undertakes Water Reuse Study
- October 2007 City Council votes to proceed with the Demonstration Project

Water Purification Demonstration Project

- November 2008 City Council approves temporary water rate increase (3.08%) to fund $11.8 million Demonstration Project
- January 2009 - August 2010

  Temporary water rates in effect

Project Objectives

- Evaluate the feasibility of using advanced treatment technology to produce water that can be sent to San Vicente Reservoir and later distributed as potable water
- Determine if the Demonstration Project provides evidence of viability for a full-scale Indirect Potable Reuse/Reservoir Augmentation (IPR/RA) project

Demonstration Project Components

- Advanced Water Purification (AWP) Facility
- Independent Advisory Panel (IAP)
- San Vicente Reservoir Study
- Regulatory requirements
- Energy and economic analysis
- Pipeline alignment study
- Public outreach & education program

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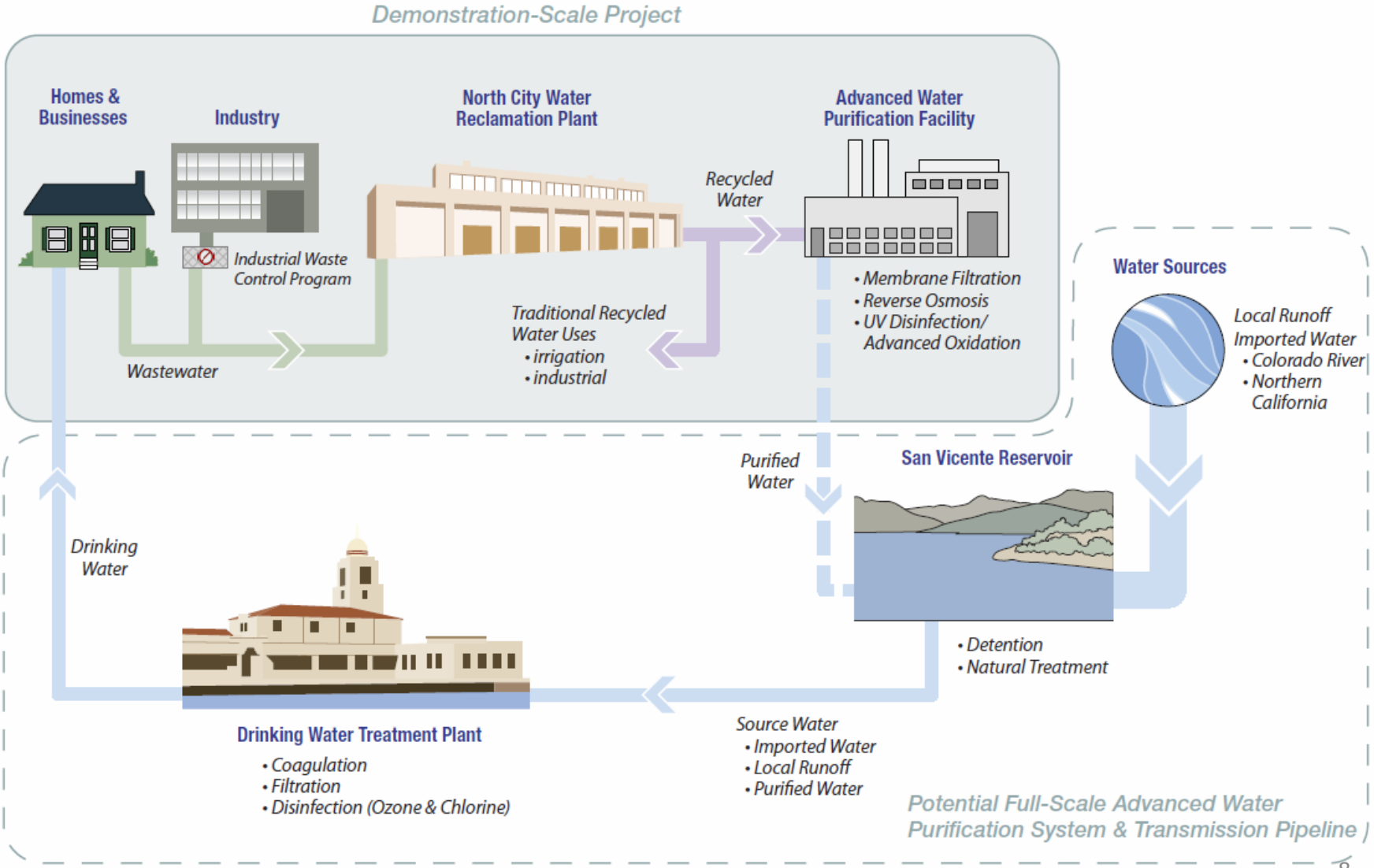
ADVANCED WATER PURIFICATION FACILITY

City of San Diego
PUBLIC UTILITIES
Water & Wastewater

City of San Diego's

Water Purification Demonstration Project

Purification Process



AWP Facility
Scope of Work

- Design, procure, install, operate, and test a one million-gallon per day (mgd) AWP Facility at North City
- Develop and implement a Testing and Monitoring Plan
- Prepare a report based on the operation and testing of the demonstration facility

AWP Facility
Testing & Monitoring Plan

- Testing period August 1, 2011 to July 31, 2012
- Measured for 342 constituents and parameters in recycled water, purified water, and imported water
- Conducted 9,000 individual water quality laboratory tests
- Implemented continuous and daily monitoring before and after each treatment step to verify integrity of each treatment process

AWP Facility Testing & Monitoring plan conclusions

- Purified water met all federal and state drinking water standards
- Continuous and daily monitoring verified the integrity of the treatment process and equipment
- Lab tests plus continuous monitoring ensures only high quality water is produced
- Water quality comparable to Orange County's Groundwater Replenishment System

AWP Facility
Testing & Monitoring Plan conclusions

- Overall water quality was exceptional, comparable to distilled water

Example of water quality results:

	TDS (salts)
Purified Water	~15 ppm*
Aqueduct water	~500 ppm
Drinking water	~500 ppm

** parts per million*

INDEPENDENT ADVISORY PANEL

Independent Advisory Panel (IAP)

- Joseph A. Cotruvo, Ph.D., Joseph Cotruvo Associates
- Richard Gersberg, Ph.D., Occupational & Environmental Health, SDSU
- George Tchobanoglous (Chair), Ph.D., P.E., UC Davis
- James Crook, Ph.D., P.E., Water Reuse
- Audrey D. Levine, Ph.D., P.E., DEE, Drinking Water Research, U.S. EPA

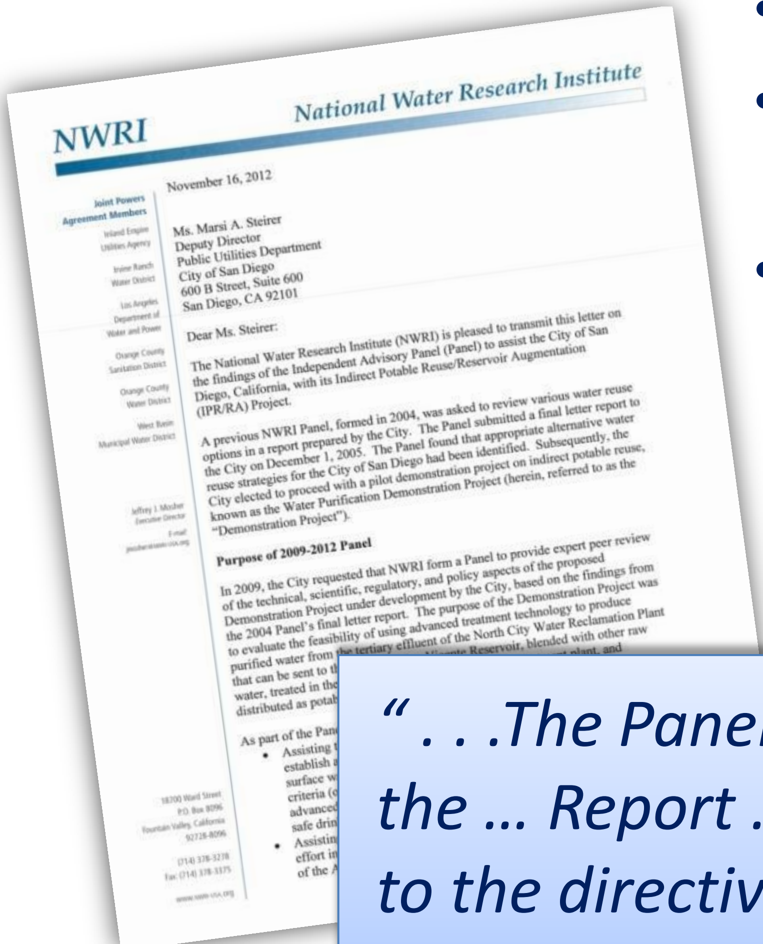
Listed left to right, by row

- Sunny Jiang, Ph.D., Civil and Environmental Engineering, UC Irvine
- Michael A. Anderson, Ph.D., Environmental Chemistry, UC Riverside
- Richard J. Bull, Ph.D., Toxicologist, Mobull Consulting
- Michael P. Wehner, Assistant General Manager, OC Water District
- David R. Schubert, Ph.D., Salk Institute for Biological Studies

Independent Advisory Panel

- Convened to provide expert peer review of the technical, scientific, and regulatory aspects of the Demonstration Project
- Similar role as IAP for the City's Water Reuse Study & Orange County's Groundwater Replenishment Project
- Provided feedback regarding
  - San Vicente Reservoir
  - AWP Facility
  - Proposed regulatory framework

Independent Advisory Panel conclusions



NWRI National Water Research Institute

Joint Powers Agreement Members
Inland Empire Utilities Agency
Irvine Ranch Water District
Los Angeles Department of Water and Power
Orange County Sanitation District
Orange County Water District
West Basin Municipal Water District

November 16, 2012

Ms. Marsi A. Steirer
Deputy Director
Public Utilities Department
City of San Diego
600 B Street, Suite 600
San Diego, CA 92101

Dear Ms. Steirer:

The National Water Research Institute (NWRI) is pleased to transmit this letter on the findings of the Independent Advisory Panel (Panel) to assist the City of San Diego, California, with its Indirect Potable Reuse/Reservoir Augmentation (IPR/RA) Project.

A previous NWRI Panel, formed in 2004, was asked to review various water reuse options in a report prepared by the City. The Panel submitted a final letter report to the City on December 1, 2005. The Panel found that appropriate alternative water reuse strategies for the City of San Diego had been identified. Subsequently, the City elected to proceed with a pilot demonstration project on indirect potable reuse, known as the Water Purification Demonstration Project (herein, referred to as the "Demonstration Project").

Purpose of 2009-2012 Panel

In 2009, the City requested that NWRI form a Panel to provide expert peer review of the technical, scientific, regulatory, and policy aspects of the proposed Demonstration Project under development by the City, based on the findings from the 2004 Panel's final letter report. The purpose of the Demonstration Project was to evaluate the feasibility of using advanced treatment technology to produce purified water from the tertiary effluent of the North City Water Reclamation Plant

- Ten IAP meetings over three years
- IAP issued summary "letter of findings" November 16, 2012
- Unanimously concluded the Demonstration Project satisfied all City Council directives, and a San Vicente Reservoir augmentation project would be a landmark project

" . . .The Panel believes that the … Report … (is) responsive to the directives set forth by the City Council."

SAN VICENTE RESERVOIR STUDY

City of San Diego
PUBLIC UTILITIES
Water & Wastewater

San Vicente Reservoir Study

Reservoir Enlargement

- San Vicente Dam and Reservoir constructed in 1944
- Reservoir enlarged from 90,000 acre feet to 247,000 acre feet
- Water Authority is constructing facilities
- City will operate reservoir, dam, and outlet works
- Refilling will take three to five years

1944 to 2012

2013

San Vicente Reservoir Study

Objectives

- Understand the characteristics of the enlarged reservoir
- Establish the retention time and dilution of purified water in the reservoir

- Determine water quality effects of purified water in the reservoir
- Secure regulatory approval from CDPH and San Diego Water Board

RESULTS

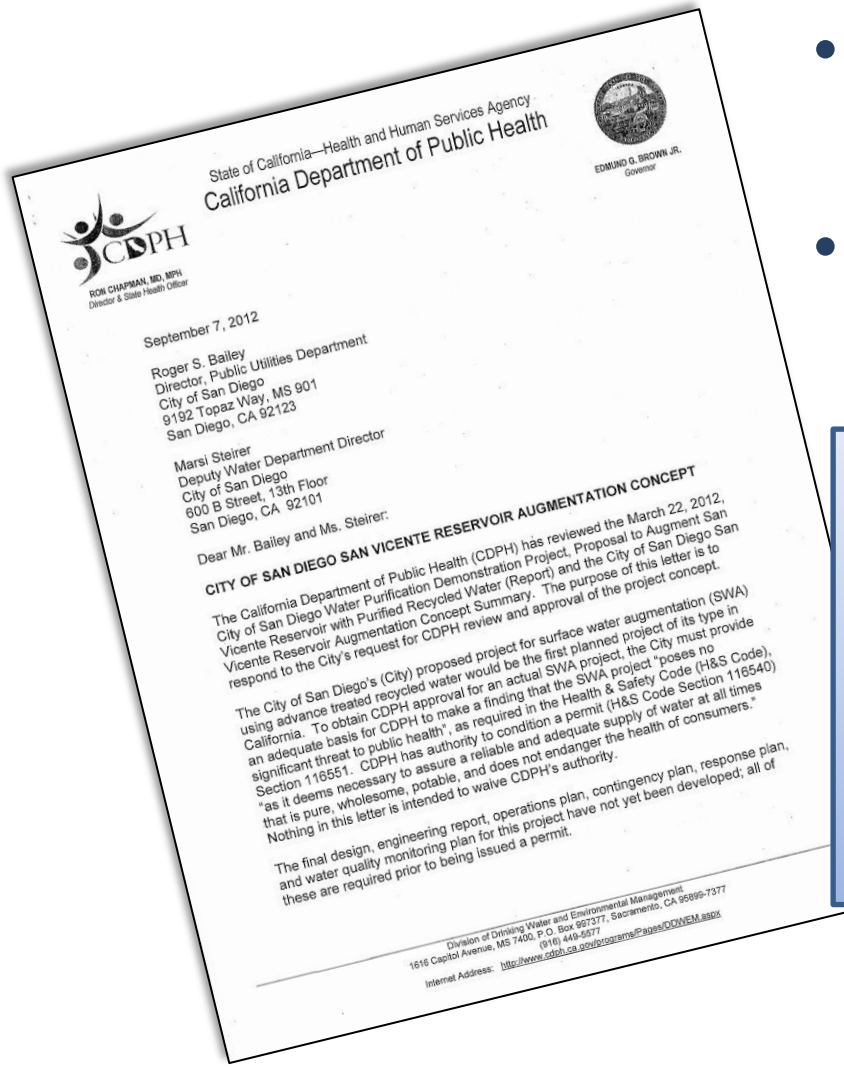
- Reservoir provides an environmental barrier that satisfies anticipated regulatory requirements
- Purified water will be diluted at least 200:1 under all anticipated reservoir operations
- Important aspects of water quality in San Vicente will not be affected by adding purified water
- Reservoir expansion will improve water quality; purified water will not substantially change this

REGULATORY FRAMEWORK

Regulatory Framework

- Regulatory agencies, CDPH, Regional Water Board, and County Dept of Environmental Health, attended IAP meetings
- Regulators commented on:
  - AWP Facility equipment
  - Testing & Monitoring Plan
  - San Vicente Reservoir Study

California Department of Public Health Concept Approval



State of California—Health and Human Services Agency
California Department of Public Health

EDMUND G. BROWN JR.
Governor

CDPH

RON CHAPMAN, MD, MPH
Director & State Health Officer

September 7, 2012

Roger S. Bailey
Director, Public Utilities Department
City of San Diego
9192 Topaz Way, MS 901
San Diego, CA 92123

Marsi Steirer
Deputy Water Department Director
City of San Diego
600 B Street, 13th Floor
San Diego, CA 92101

Dear Mr. Bailey and Ms. Steirer:

CITY OF SAN DIEGO SAN VICENTE RESERVOIR AUGMENTATION CONCEPT

The California Department of Public Health (CDPH) has reviewed the March 22, 2012, City of San Diego Water Purification Demonstration Project, Proposal to Augment San Vicente Reservoir with Purified Recycled Water (Report) and the City of San Diego San Vicente Reservoir Augmentation Concept Summary. The purpose of this letter is to respond to the City's request for CDPH review and approval of the project concept.

The City of San Diego's (City) proposed project for surface water augmentation (SWA) using advance treated recycled water would be the first planned project of its type in California. To obtain CDPH approval for an actual SWA project, the City must provide an adequate basis for CDPH to make a finding that the SWA project "poses no significant threat to public health", as required in the Health & Safety Code (H&S Code), Section 116551. CDPH has authority to condition a permit (H&S Code Section 116540) "as it deems necessary to assure a reliable and adequate supply of water at all times that is pure, wholesome, potable, and does not endanger the health of consumers." Nothing in this letter is intended to waive CDPH's authority.

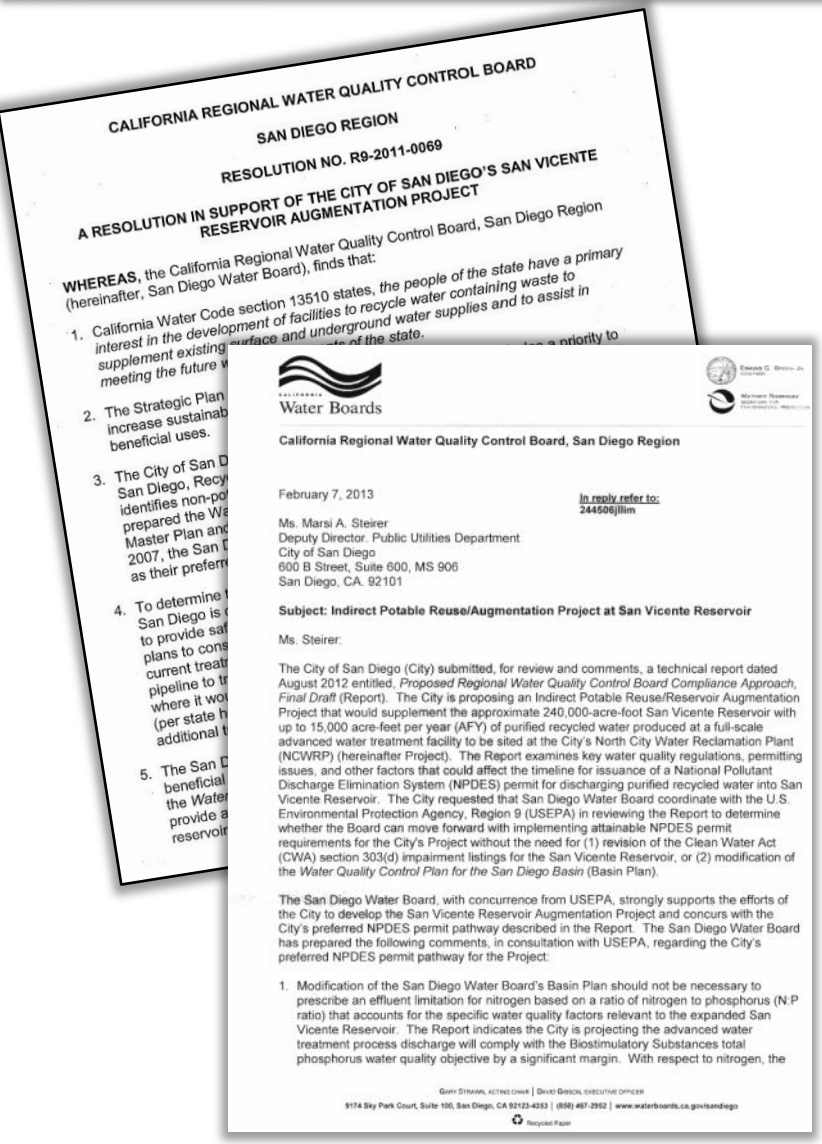
The final design, engineering report, operations plan, contingency plan, response plan, and water quality monitoring plan for this project have not yet been developed; all of these are required prior to being issued a permit.

Division of Drinking Water and Environmental Management
1616 Capitol Avenue, MS 7400, P.O. Box 997377, Sacramento, CA 95899-7377
(916) 449-5577
Internet Address: http://www.cdph.ca.gov/programs/Pages/DDWEM.aspx

- City submitted concept proposal to CDPH in March 2012
- CDPH concept approval letter September 7, 2012

"Based on CDPH's review of the City's … submittal … CDPH approves the San Vicente Reservoir Augmentation Concept."

REGIONAL WATER BOARD



CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

SAN DIEGO REGION

RESOLUTION NO. R9-2011-0069

A RESOLUTION IN SUPPORT OF THE CITY OF SAN DIEGO'S SAN VICENTE RESERVOIR AUGMENTATION PROJECT

WHEREAS, the California Regional Water Quality Control Board, San Diego Region (hereinafter, San Diego Water Board), finds that:

1. California Water Code section 13510 states, *the people of the state have a primary interest in the development of facilities to recycle water containing waste to supplement existing surface and underground water supplies and to assist in meeting the future*

2. The Strategic Plan increase sustainab beneficial uses.

3. The City of San D San Diego, Recy identifies non-po prepared the Wa Master Plan and 2007, the San D as their preferr

4. To determine San Diego is to provide saf plans to cons current treat pipeline to t where it wo (per state h additional t

5. The San D beneficial the Water provide a reservoir

Water Boards

California Regional Water Quality Control Board, San Diego Region

February 7, 2013

In reply refer to: 244506jllim

Ms. Marsi A. Steirer
Deputy Director. Public Utilities Department
City of San Diego
600 B Street, Suite 600, MS 906
San Diego, CA. 92101

Subject: Indirect Potable Reuse/Augmentation Project at San Vicente Reservoir

Ms. Steirer:

The City of San Diego (City) submitted, for review and comments, a technical report dated August 2012 entitled, *Proposed Regional Water Quality Control Board Compliance Approach, Final Draft* (Report). The City is proposing an Indirect Potable Reuse/Reservoir Augmentation Project that would supplement the approximate 240,000-acre-foot San Vicente Reservoir with up to 15,000 acre-feet per year (AFY) of purified recycled water produced at a full-scale advanced water treatment facility to be sited at the City's North City Water Reclamation Plant (NCWRP) (hereinafter Project). The Report examines key water quality regulations, permitting issues, and other factors that could affect the timeline for issuance of a National Pollutant Discharge Elimination System (NPDES) permit for discharging purified recycled water into San Vicente Reservoir. The City requested that San Diego Water Board coordinate with the U.S. Environmental Protection Agency, Region 9 (USEPA) in reviewing the Report to determine whether the Board can move forward with implementing attainable NPDES permit requirements for the City's Project without the need for (1) revision of the Clean Water Act (CWA) section 303(d) impairment listings for the San Vicente Reservoir, or (2) modification of the *Water Quality Control Plan for the San Diego Basin* (Basin Plan).

The San Diego Water Board, with concurrence from USEPA, strongly supports the efforts of the City to develop the San Vicente Reservoir Augmentation Project and concurs with the City's preferred NPDES permit pathway described in the Report. The San Diego Water Board has prepared the following comments, in consultation with USEPA, regarding the City's preferred NPDES permit pathway for the Project:

1. Modification of the San Diego Water Board's Basin Plan should not be necessary to prescribe an effluent limitation for nitrogen based on a ratio of nitrogen to phosphorus (N:P ratio) that accounts for the specific water quality factors relevant to the expanded San Vicente Reservoir. The Report indicates the City is projecting the advanced water treatment process discharge will comply with the Biostimulatory Substances total phosphorus water quality objective by a significant margin. With respect to nitrogen, the

GARY STRAWN, ACTING CHAIR | DAVID GIBSON, EXECUTIVE OFFICER
9174 Sky Park Court, Suite 100, San Diego, CA 92123-4353 | (858) 467-2952 | www.waterboards.ca.gov/sandiego
Recycled Paper

- Regional Water Board Resolution re. IPR/RA, October 12, 2011

> *Regional Water Board "… supports efforts to develop the Reservoir Augmentation Project at San Vicente Reservoir."*

- City submitted Proposed Compliance Approach to Regional Water Board on August 30, 2012
- City received a letter of concurrence from the Regional Water Board on February 12, 2013

> *"The . . . Water Board, with concurrence from USEPA, strongly supports the efforts of the City to develop the San Vicente Reservoir Augmentation Project…"*

ENERGY & ECONOMIC ANALYSIS & FULL-SCALE FACILITIES

City of San Diego
PUBLIC UTILITIES
Water & Wastewater

Demonstration Project
San Vicente IPR/RA Cost Estimate

	Capital	Annual Operating and Maintenance
AWP Facility	$144,700,000	$8,145,000
Pipeline & Pump station	$224,500,000	$3,385,000
Increased North City Tertiary Treatment	$0	$3,965,000
Total	**$369,200,000**	**$15,495,000**

- Result - $2,000 per acre-foot to produce and convey 15 mgd of purified water to San Vicente Reservoir

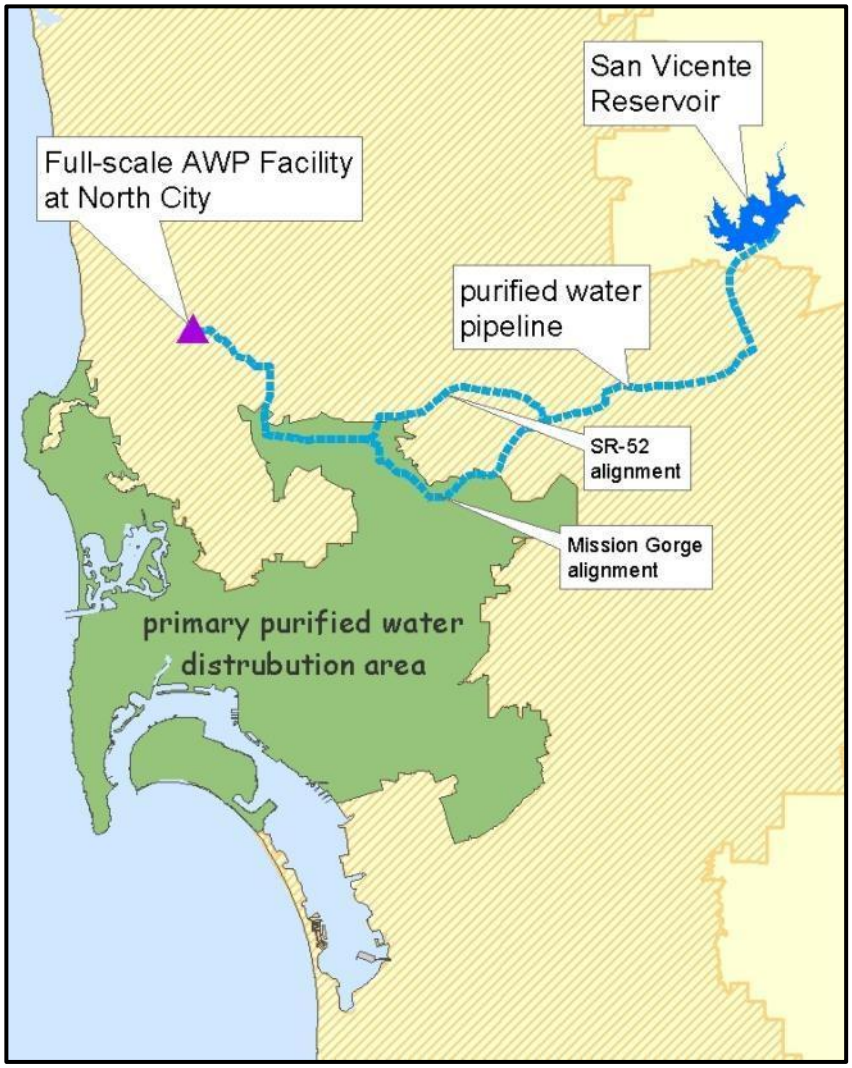
Demonstration Project, San Vicente IPR/RA
Avoided Wastewater Costs

	Capital	Annual Operating and Maintenance
Point Loma Wet Weather Storage Facility	$123,000,000	$6,150,000
Reduced Treatment at Point Loma	$0	$2,210,000
Reduced Pumping at Pump Station No. 2	$0	$450,000
Total	**$123,000,000**	**$8,810,000**
Total (per-acre-foot basis)	**$1,000**	

- Net cost: $1,000 per acre-foot to produce and convey 15 mgd of purified water to San Vicente Reservoir

Pipeline Alignment Study

- 22 mile, 36-inch pipeline to convey water from the AWP Facility to San Vicente Reservoir
- Two potential alignments identified:
  - State Route 52 alignment
  - Mission Gorge alignment
- Additional analysis is needed to refine alignment



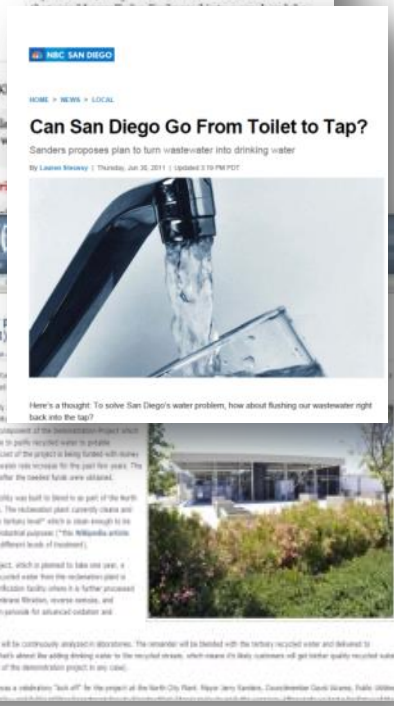
PUBLIC OUTREACH & EDUCATION PROGRAM

Public Outreach & Education Program

Program Statistics through December 31, 2012

- Speakers Bureau presentations/attendees 132/3,500
- Community events/attendees 42/4,500
- Facility tours/visitors 243/3,244

PUBLIC OUTREACH & EDUCATION PROGRAM

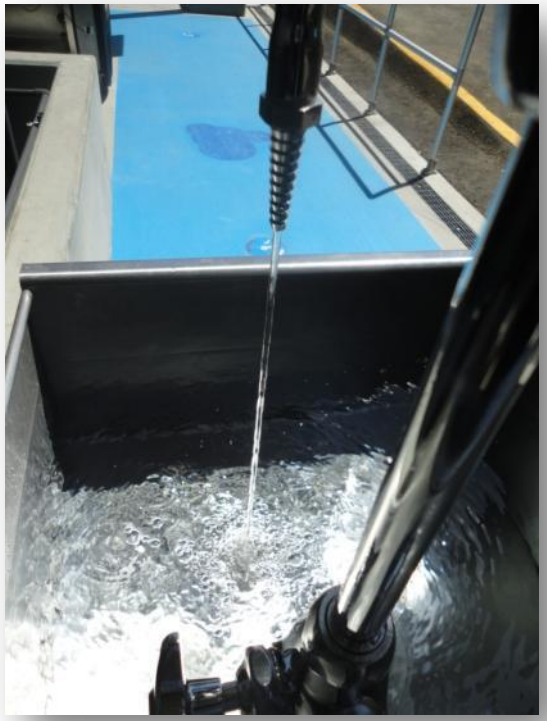


On-going use of Remaining Funds

- Continuing AWP Facility operations
  - Prop 50 extended testing (2013 - 2014)
  - Prop 84 potable reuse study (2014 - 2015)
- AWP Facility tours
- Continuing outreach efforts
  - Tours
  - Speakers Bureau
  - Community events
- Next steps

Next Steps

- Determine appropriate cost-sharing concepts for water-wastewater funding sources
- Determine contracting modes
- Refine pipeline alignment
- Coordinate with Point Loma 2015 Permit Renewal and next steps associated with the Recycled Water Study
- Monitor development of direct potable reuse regulations

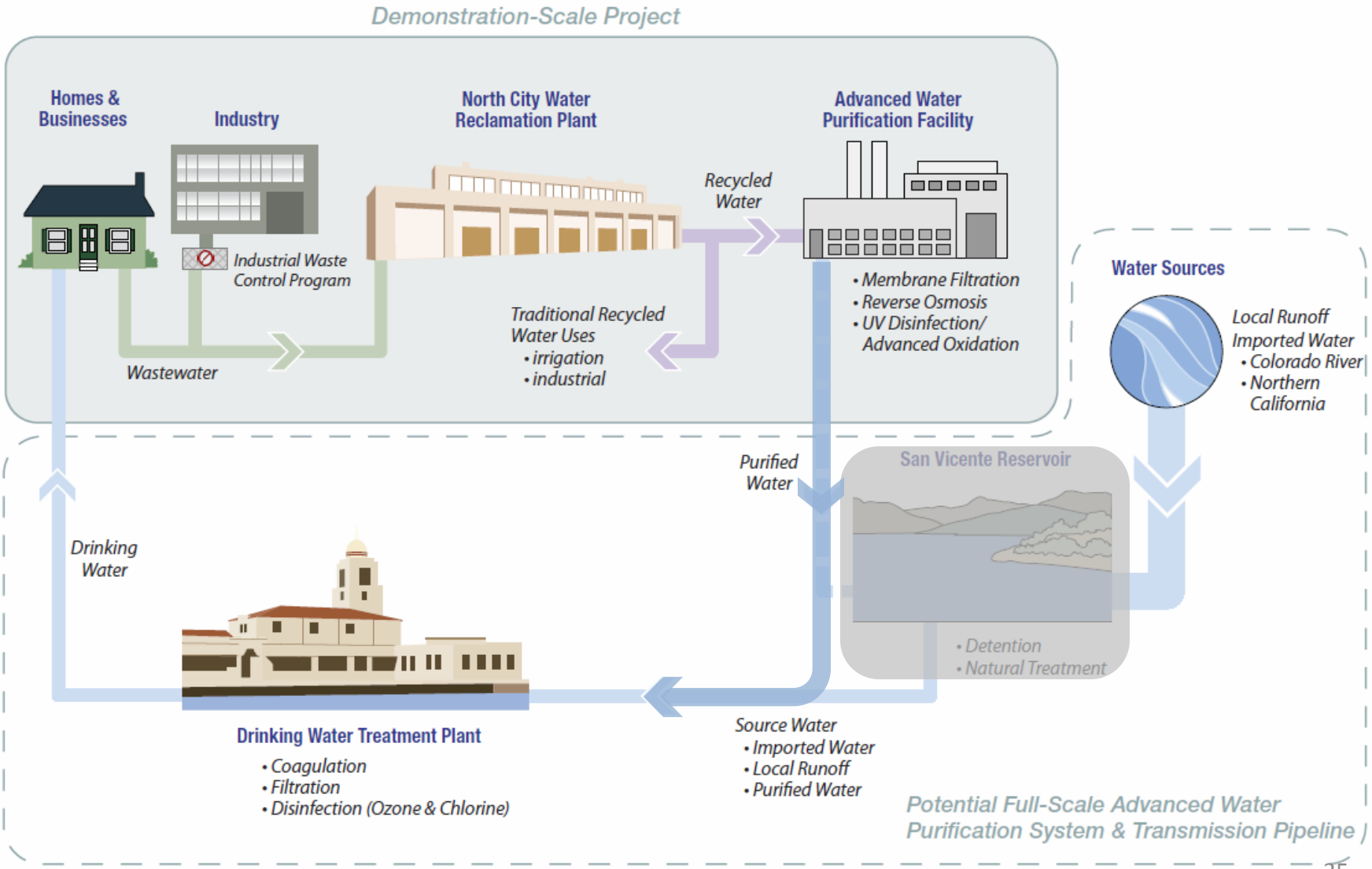


DIRECT POTABLE REUSE CONCEPT

City of San Diego's

Water Purification Demonstration Project

Purification Process



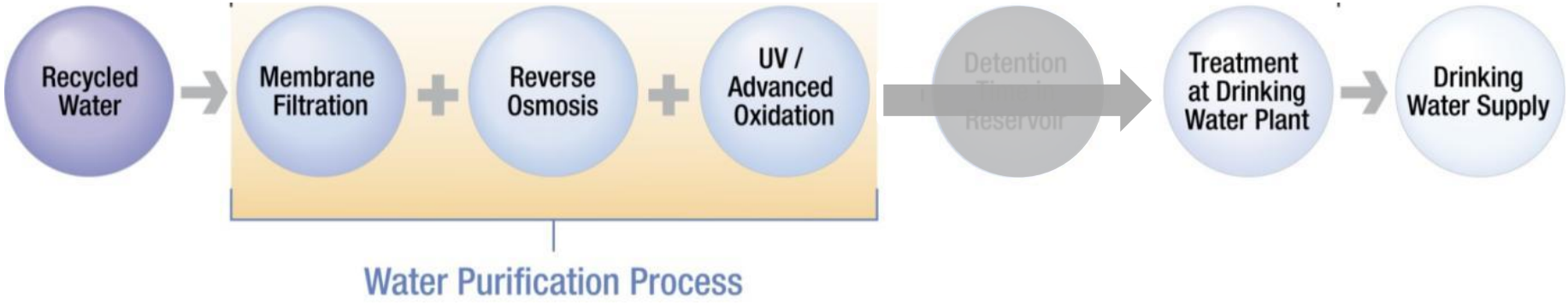
SENATE BILL 918

Senate Bill 918 directs CDPH to:

- Adopt regulations for IPR/groundwater replenishment December 31, 2013
- Convene an expert panel to advise CDPH on IPR/reservoir augmentation and feasibility of DPR
- Adopt regulations for IPR/reservoir augmentation December 31, 2016
- Report on feasibility of DPR December 31, 2016

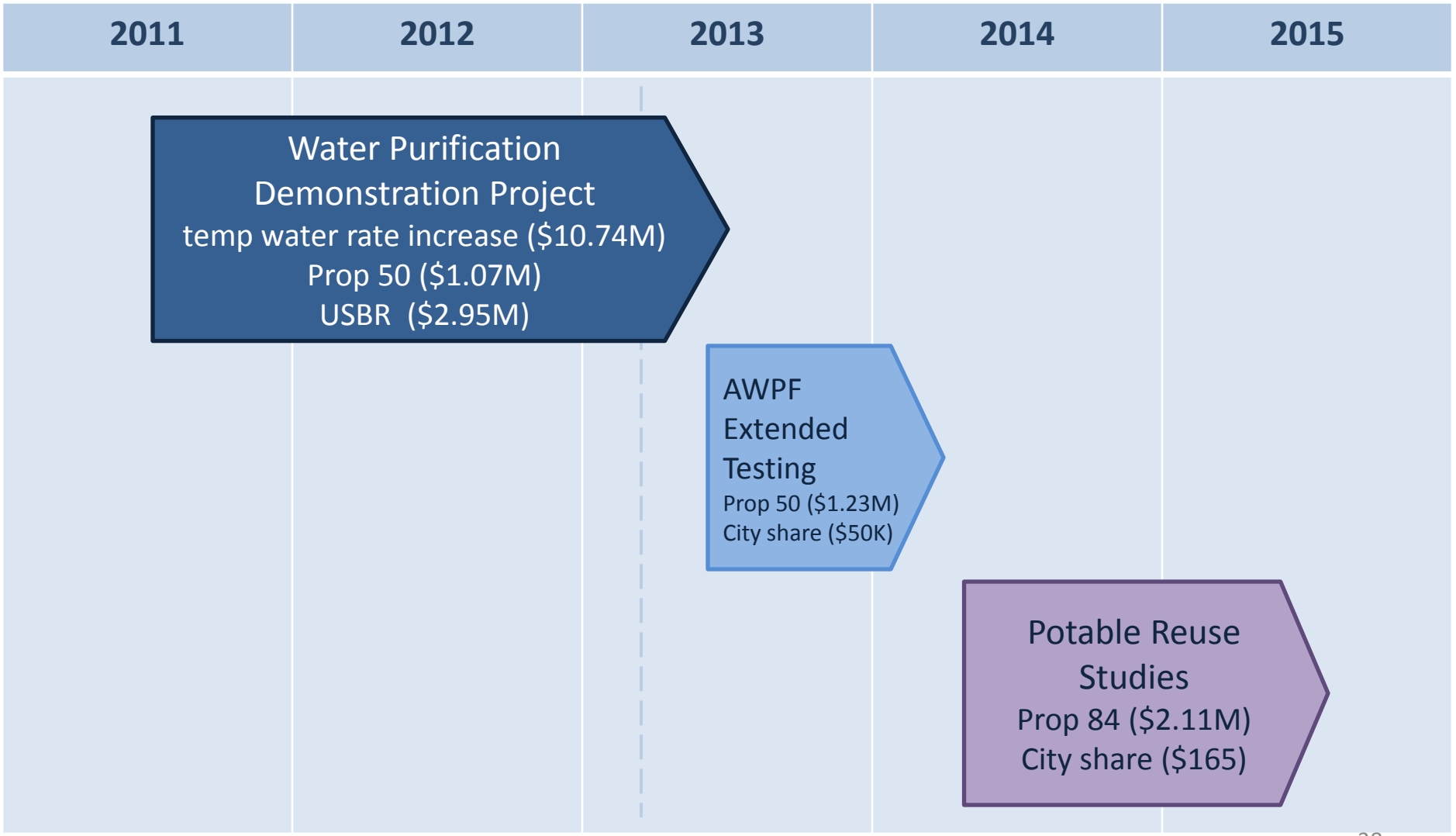
Direct Potable Reuse Concept

Without the reservoir, additional barriers (treatment or monitoring) will be required to achieve the same level of public heath protection. What are those additional barriers?



multiple treatment barriers are the key to protecting public heath

CONTINUED OPERATION OF DEMONSTRATION AWP FACILITY



Water Purification | Demonstration Project

PureWaterSD.org

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Water Purification Demonstration Project

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City of San Diego PUBLIC UTILITIES Water & Wastewater